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When and How Communicated Guilt Affects Contributions in Public Good Dilemmas

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Abstract

Two laboratory studies investigated how groups may deal with the strong emotions that social dilemmas often elicit. A first study showed that a new group member evaluated guilt communicated by a fellow group member as more instrumental than neutral emotion feedback when the amount of required resources to obtain the public good (i.e., provision point) was perceived as difficult to obtain. A second study revealed that participants use communicated guilt to draw inferences about both past and future contributions from all fellow group members. Participants also contributed more themselves and adhered to equality more often when guilt versus no emotion was communicated, but only when the provision point was high. Expected contributions from fellow group members mediated this effect.

When and How Communicated Guilt Affects Contributions in Public Good Dilemmas.

People interacting in groups sometimes find that their individual interests conflict with the collective interest. Individuals may be tempted, for example, to refrain from investing time, energy, or resources in a team project, so they may free-ride on the efforts of others. If, however, each individual follows this strategy, the team project will inevitably fail and all will be worse off than if they would have cooperated. This type of mixed-motive situation is referred to as a social dilemma, or—more specifically—as a *public good dilemma* (for reviews, see Pruitt, 1998; Weber, Kopelman, & Messick, 2004). Often, public goods can only be provided when the total amount of contributions surpasses a certain threshold or *provision point*. Such instances are known as *step-level* public good dilemmas and will be the focus of the present research.

In step-level public good dilemmas it is important for people to display cooperation by means of coordinating their individual contributions so that they do not squander resources in an attempt to reach the provision point. A generally preferred solution to this coordination problem is for each group member to contribute an equal share of the provision point (Lutz, 2001; Messick, 1993). Indeed, because this so-called *equality rule* is both fair and efficient (Stouten, De Cremer, & Van Dijk, 2005), it is an effective coordination principle that is frequently adhered to or at least used as an anchor to base one's eventual contributions on (Allison, McQueen, & Schaerfl, 1992; Samuelson & Allison, 1994; Van Dijk & Wilke, 1995).

For an individual group member, using the equality rule to coordinate contributions is only effective when the other group members can be expected to act in a similar way. One therefore needs to be responsive to cues from other group members that may signal their intentions to cooperate, especially when one is a newcomer to a group and thus lacks information about previous social dilemma interactions. One cue that people entering an

existing group may pay attention to, and one that has been neglected by social dilemma research so far, is how the group members *feel* about past decisions. An interesting illustration that affect about past decision behavior within the group may be present and thus can be used by group members to base their inferences and decisions on is provided by Dawes, McTavish and Shaklee (1977; see also Xiao & Houser, 2005). They noted that after playing a social dilemma "one of the most significant aspects of this study did not show up in the data analysis" (p. 7) thereby referring to the observation that it was not unusual for participants "to become extremely angry, or to become tearful" (p. 7) at other participants who had defected. In fact, these authors even note that the affect level was so high that they were unwilling to run any intact groups because of the effect the game might have on the members' feelings of each other.

In the present research we therefore aim to answer two questions. First, when will group members' display of emotions such as guilt be considered as useful or informative in determining decisions to contribute, or—as we prefer to define it in the present paper—when will it be evaluated as *instrumental* (Experiment 1)? Second, how will this emotional display affect contributions and the use of the equality rule in public good dilemmas (Experiment 2)? In the present paper, we will first claim that emotions can serve as important cues to base decisions on. Second, we will reason that such cues will be most functional when coordination is needed the most. Thus, we will develop the argument that communicated emotions are most instrumental when it is relatively difficult to achieve the public good (i.e., high provision point).

Emotional Displays in Social Dilemmas

A large quantity of research has addressed what exactly an emotion is. Accordingly, emotions can be defined as: "episodic, relatively short-term biologically based patterns of perception, experience, physiology, action, and communication that occur in response to

specific physical and social challenges and opportunities" (Keltner & Gross, 1999). However, scholars have also started to focus on the potential of emotions to regulate and coordinate social interactions (i.e., a functional account; Frijda & Mesquita, 1994; Keltner & Gross, 1999; Oatley & Jenkins, 1996).

The idea that communicated emotions may convey certain intentions which one may subsequently take into account for one's own actions has been convincingly demonstrated by Van Kleef, De Dreu and Manstead (2006; see also De Cremer, Wubben, & Brebels, in press; Sinaceur & Tiedens, 2006; Van Kleef, De Dreu, & Manstead, 2004). These authors showed that when a negotiation opponent communicated guilt, people were unlikely to concede because they expected their opponent to be willing to make up for his or her tough demands that were offered in previous rounds (Van Kleef et al., 2006). Even more important for the present paper, very recent research has provided first evidence that in step-level public good dilemmas emotions communicated by fellow group members shape a third party's justice judgments of the group, which subsequently affect this person's preferences for structural change (Wubben, De Cremer, & Van Dijk, in press). Thus, the information that communicated emotion conveys about fellow group members' intentions may be expected to also influence a third party's contribution decisions and use of the equality rule.

Communicated Guilt as a Coordination Means in Step-Level Public Good Dilemmas

What do people entering an existing group wish to know in a public good dilemma? They are probably interested in how previous social dilemma interactions have developed and whether or not the other group members can be expected to cooperate in the future. Emotions communicate such inferences. In the present article we focus on communicated guilt. We do so because people often evaluate social dilemmas in terms of morality (e.g., Van Lange & Kuhlman, 1994), and guilt is the emotion that is experienced after "having transgressed a

moral imperative" in the past (Lazarus, 1991, p. 240; see for applications of guilt in social dilemma settings e.g., Ketelaar & Au, 2003; Nelissen, Dijker, & De Vries, 2007).

What do we infer if we see that a particular member communicates guilt? The communication of guilt may simultaneously generate inferences about the person displaying guilt *and* the other persons in the group. In a public good dilemma people may first of all conclude that the member who communicates guilt has not contributed enough to the public good. And if not contributing to the public good in a previous decision round leads a group member to feel guilty, a newcomer may infer that there must have been a well-established norm of cooperation to which the other group members did adhere. That is, if one's fellow group members would have refrained from cooperating as well, there would be no norm prescribing cooperation and not contributing to the public good would therefore be no reason to experience guilt. Guilt may therefore not only signal that the person displaying guilt did not contribute, but also that the other persons in the group did cooperate. Thus, whereas at first sight guilt merely indicates the presence of a repentant transgressor, other group members may indirectly profit from this emotional display because it may lead third parties to evaluate them as prosocial.

So how do these inferences affect the expectations regarding the *future*? From a functional perspective, guilt signals appeasement (Barrett, 1995; Keltner & Buswell, 1997). As such it is associated with an intention to repair the damage that one has inflicted to a relationship (Baumeister et al. 1994, Lewis, 2000). Guilt therefore leads to increased prosocial behavior, including helping, making amends, compliance and cooperation (Carlsmith & Gross, 1969; Ketelaar & Au, 2003; Regan, Williams & Sparling, 1972; Van Kleef et al. 2006). A person communicating guilt therefore signals the willingness to contribute to the public good in the future. And because guilt may also signal that the other group members are willing to contribute, a third party may infer that all fellow group

members intend to cooperate in the upcoming decision round. Thus, even though guilt suggests collective failure in the *past*, people may infer that their fellow group members aim to reach the provision point in the *future*.

The main question in Experiment 1 which we alluded to earlier (i.e., when do newcomers find communicated guilt instrumental in determining their contribution decisions?) is thus related to the question "When do people find it instrumental to know that one's fellow group members can be expected to cooperate?" The answer is not immediately clear, because having information about fellow group members' intentions will not always be required to determine how much one should contribute to the public good in order to reach the provision point (cf. Van Vugt & De Cremer, 2002; Wubben et al., in press, for similar accounts of instrumentality). In fact, even without receiving emotion feedback it is quite common for people to expect others to adhere to equality (Allison et al., 1992; Samuelson & Allison, 1994; Van Dijk & Wilke, 1995). Communicated guilt may therefore primarily facilitate coordination under circumstances where people would anticipate that their fellow group members might not cooperate. Under such conditions, people may feel that their own contributions may be wasted. In step-level public good dilemmas, the anticipation that others may not contribute such that own contributions may be wasted, is referred to as *fear* (Rapoport & Eshed-Levy, 1989). It has been shown to be particularly prevalent when the provision point increases to more than 60% of group members' total endowments (Poppe & Zwikker, 1996). Indeed, under such circumstances efficient coordination is impeded because people's actual contributions do not rise accordingly, making not only that the public good is provided less often but also that more resources are wasted by those who did contibute (Suleiman & Rapoport, 1992). Therefore we reason that only when the provision point is high the display of guilt may be evaluated as more instrumental than neutral emotion feedback, because only then there is substantial fear that communicated guilt may help reduce.

Experiment 1

Experiment 1 was designed to test if communicated guilt is particularly instrumental in deciding how much to contribute when the provision point is perceived as difficult to obtain. That is, as a first test of our hypothesis we used a subjective evaluation of a fixed provision point to investigate the potential importance of communicated guilt for decision-making in step-level public good dilemmas. Thus, we asked participants to what extent they felt that many chips were required to reach the provision point and, subsequently, how helpful and useful they considered the emotion feedback from a fellow group member to be. Using a separate first study for only these critical inferences allowed us to measure perceived instrumentality directly without unintentionally influencing participants' contribution decisions.

Method

Participants and experimental design. Participants were 47 undergraduate students (17 men and 30 women, average age = 18.79 years, *SD* = 0.95) who participated voluntarily in exchange for course credits or a monetary award of €3 (approximately $4). The study consisted of an Emotion (guilt vs. neutral) × Judgment of provision point level (continuous) between-participants design. Participants were randomly assigned to the emotion conditions.

Procedure. Upon arrival at the laboratory, participants were divided into groups of three and were placed in front of a computer in three adjacent individual cubicles. It was explained that the experiment was about "taking decisions in groups" and that all interactions between group members would take place via the computer.

After being seated, participants were informed that two group members would immediately start one trial of making decisions in groups, while one group member would join the others in round two as a newcomer. Although participants believed that the computer assigned the role of newcomer at random to one of the group members, in reality the

participant was always the newcomer. Furthermore, the participant was denoted by the letter B, whereas the other two persons would be known as group member A and C. While group members A and C were allegedly playing the first trial in a public good dilemma, the participant was requested to fill out a short individual filler task. Next, the nature of the public good was explained. Participants were told that sometimes personal interest and collective interest are at odds and that they and their group members would be placed in such a situation. It was mentioned that when the participant joined the other two group members, the game would be transformed from a two-person to a three-person game. Each group member would receive 200 chips and had to decide how many chips to contribute to the group. We set the provision point at the intermediate level of 50% (Poppe & Zwikker, 1996). Thus, if 300 or more chips were contributed in total to the group, each group member would receive 280 chips, regardless of their own contributions to the group. Thus, if the threshold was reached, each participant would receive the bonus of 280 chips plus the chips he or she decided not to contribute. However, if the provision point of 300 chips was not reached, no bonus would be given and participants would only have the chips that they had decided not to contribute.

Because we were interested in exploring the influence that participants' *subjective* evaluation of the difficulty to establish the provision point could exert on how instrumental participants considered the communicated emotion information to be (see below), we asked them directly to what extent they felt that they had to contribute many chips to obtain the bonus (1 = *totally disagree* to 7 = *totally agree*).

Manipulation. We manipulated communicated emotion by providing participants with emotion feedback from the participants who had allegedly played a trial in a public good dilemma already. To enhance the credibility of this manipulation, participants were requested to fill out a printed form with three questions that had just been brought in by the

experimenter. First, participants had to indicate whether they were participant A, B or C. Second, they had to fill out whether they were a newcomer or had already been taking decisions for one round. For the third and last question it was made very clear that it should only be answered by participants who in the second question had indicated not to be a newcomer. It read: "How do you feel with respect to how the contributions to the collective pool are developing?" All participants correctly indicated that they as group member B were a newcomer and subsequently they all left the third question unanswered, as was instructed. Next, they were asked to contact the experimenter who let them wait for a few minutes until everybody had filled out their form. When eventually all three group members were ready, the experimenter would open the doors of the three adjacent cubicles simultaneously and instruct the group members collectively. Thus, a situation was created in which the subjects could not see each other, but all could see the experimenter. The experimenter explained that he would collect all forms, complete a few administrative tasks and would then redistribute the forms. A minute after each participant had handed over his or her form, the experimenter reopened the three cubicles one at a time to ask each participant separately if it was correct that he or she would be the newcomer in the upcoming trial. When participants confirmed this, he delivered them a bogus form that was exactly similar to the one the participant had filled out, but with different answers to the three questions. The question "which group member are you" was answered with "A" and it was indicated that the fellow group member who allegedly filled out the form was not a newcomer, but had already been taking decisions during the first round. The communicated emotion was manipulated by means of the third answer. The question "How do you feel with respect to how the contributions to the collective pool are developing?" was answered with either "I feel rather guilty about these contributions" in the guilt condition or with "I don't really have a pronounced feeling about

these contributions" in the neutral-emotion condition. Subsequently, the dependent measures were administered. Finally, participants were debriefed, paid and thanked[1].

Dependent measures. To assess whether participants considered the communicated emotion to be instrumental in determining their contributions, we used two items. More precisely, we asked them to indicate to what extent they considered what member A wrote about his or her feelings to be "useful" and "necessary information" to help determining how much to contribute. (i.e., "I find what group member A has written about his or her feelings necessary to determine accurately how many chips I should contribute" and "The form that has been filled out by group member A helps me to determine how many chips I have to contribute"; 1 = *totally disagree* to 7 = *totally agree*). These two items were averaged into a measure of *instrumentality of communicated emotion* ($r = .69$, $p < .001$). To check the effectiveness of the emotion manipulation, we presented participants with a variety of emotions—including the focal emotion guilt—and asked them to what extent they believed participant A experienced this emotion (1 = *totally disagree* to 7 = *totally agree*; cf. Tiedens, 2001).

Results and Discussion

Manipulation checks. To check the effectiveness of the emotion manipulation, the item measuring to what extent the participants perceived group member A to feel guilty was submitted to a one-way ANOVA, revealing a main effect of emotion. When group member A had communicated guilt, participants reported this person to feel more guilty ($M = 6.33$, $SD = 1.35$) than when no emotion had been communicated ($M = 3.27$, $SD = 1.08$); $F(1, 45) = 74.61$, $p < .001$, $\eta^2 = .62$.

Instrumentality of communicated emotion[1]. To analyze when participants perceived the communicated emotion to be most instrumental, we first centered the scores on the item measuring to what extent participants judged the provision point to be high (Cohen, Cohen,

West, & Aiken, 2003). We also effect-coded the emotion variable by assigning the value -1 to the guilt condition and the value 1 to the neutral condition. Next, a hierarchical regression analysis was conducted in which the instrumentality of the communicated emotion was predicted by the main effects of emotion and judgment of provision point level in step 1 and the product of these two variables in step 2.

As predicted, the analysis revealed a significant interaction term between emotion and judgment of provision point level ($\beta = -.31$, $p < .05$). To further explore this effect, we plotted the interaction using the predicted means one standard deviation above and below the mean of the measure of judgment of provision point level (for high and low scores on judgment of provision point level, respectively). These means are presented in Figure 1. Subsequent simple-effect analyses revealed that when the provision point was evaluated as difficult to obtain, communicated guilt was considered more instrumental than neutral emotion feedback in determining how much to contribute ($\beta = -.50$, $p < .05$). On the other hand, when participants felt they did not need to contribute many chips to reach the provision point, no such difference emerged ($\beta = .13$, $p = .55$).

Experiment 1 can be regarded as a first test of the idea that emotional information from fellow group members is not always regarded as useful information to employ in one's decision behavior. Indeed, the results provide supportive evidence for the idea that people entering the group value and desire emotional information more when they estimate the provision point as difficult to reach. These findings should be interpreted with caution, however, for two reasons. First, we did not manipulate the provision point level but used a subjective evaluation of the difficulty to reach the provision point. Second, we measured perceptions instead of behavior to assess the instrumentality of the communicated emotion. The results of Experiment 1 nevertheless suggest that effects of communicated guilt can be expected to become manifest only when the provision point is high.

Experiment 2

Having established when emotion information will probably be most instrumental in providing the public good and thus when effects of communicated guilt can be expected to occur, we moved on to test our second research question, that is, will communicated guilt affect a third party's inferences and contribution decisions and, if so, how? To this end, we assessed not only people's inferences about previous events that caused their fellow group member to feel guilty, but also measured contribution decisions and contribution expectations at different levels of the provision point. In addition we now manipulated the provision point. More precisely, in the low-provision-point condition we set the threshold to a mere 35%, but in the high-provision-point condition we set it at 70%; a level at which fear is typically important (Poppe & Zwikker, 1996; Suleiman & Rapoport, 1992).

In our introduction we already theorized which inferences people may make when they learn that a member communicates guilt. In experiment 2 we will actually measure these inferences about the previous and upcoming decision round to test our hypotheses. Because we will not provide participants with specific information of how high the provision point in the first round was (see below), we hypothesize that participants' inferences of their fellow group members' previous contributions are based only on the emotion manipulation. More specifically, as explained before, we first expect that when a person communicates guilt in a public good dilemma, a newcomer to the group will infer that this person has contributed less in the previous decision round than the other group member (*Hypothesis 1a*). In line with this hypothesis, we predict that a person communicating guilt will also be inferred to have contributed less than when this person would have communicated no emotion (*Hypothesis 1b*). As a result, a newcomer may conclude that it is less likely that the public good has been provided in the previous trial when guilt as opposed to no emotion is communicated (*Hypothesis 1c*). Finally, a newcomer may infer that when a group member communicates

guilt, the other person in the group has made higher contributions than when a group member communicates no emotion *(Hypothesis 1d)*.

As alluded to earlier, the emotional display of guilt also allows one to draw inferences about contributions in the upcoming decision round. As for the person who communicates guilt one may wonder to what extent this person will actually make up for his or her violation. In this regard it seems that guilt merely signals an intention to repair a detrimental action and not so much an intention to overcompensate it (Baumeister et al. 1994). Therefore we predict that a person communicating guilt will be expected to increase his or her contributions compared to the previous round. In that case, this person can be expected to restore his or her cooperation to the same level as a person who provided only neutral feedback. A third party may therefore expect a person communicating guilt to increase his or her contributions compared to the previous decision round so that an effect of communicated guilt versus no emotion on expected contributions in the upcoming decision round will not emerge (*Hypothesis 2a*). As for the other group member, one may infer that this person has already displayed a willingness to cooperate—something that is not so obvious when no emotion is communicated. A newcomer may then infer that this group member can be expected to cooperate again in the upcoming decision round, even when the provision point is high. Thus, we predict that this person will be expected to contribute when the provision point is low, regardless of the emotion that is communicated, while in the high-provision-point condition this person will be expected to contribute more when guilt as opposed to no emotion is communicated (*Hypothesis 2b*). The total expected contributions of both fellow group members together, then, will yield a similar interactive effect of emotion and provision point (*Hypothesis 2c*).

How will these favorable expectations about fellow group members' contributions when guilt is communicated affect a newcomer's own contributions? A prevalent reason not

to contribute to a public good dilemma consists of the *fear* that one's resources are wasted if others refrain from contributing (Parks & Hulbert, 1995; Rapoport & Eshed-Levy, 1989). This fear is especially dominant when the provision point is high (Poppe & Zwikker, 1996; Suleiman & Rapoport, 1992). The display of guilt will reduce this fear, however, due to the implicit assumption that one's fellow group members can be expected to cooperate. As a result, we expect that newcomers will be cooperative and not fear adhering to equality, even when the provision point is high. Thus, an interactive effect of emotion and provision point on contributions (*Hypothesis 3a)* and adherence to equality (*Hypothesis 3b)* is predicted, such that differential effects of guilt and neutral emotion feedback will only emerge when the provision point is high. In that case we predict a third party to cooperate more when guilt instead of no emotion is communicated. Following this reasoning, we predict that a third party's expectations of his or her fellow group members' contributions mediate the expected interaction between emotion and provision point level on a third party's contributions (*Hypothesis 4).*

Method

Participants and experimental design. A total of 152 undergraduate students (37 men and 115 women, average age = 19.04 years, *SD* = 1.60) participated voluntarily in exchange for course credits or a monetary award of €4 (approximately $5). Participants were randomly assigned to a 2 (emotion) × 2 (provision point) factorial design.

Procedure. For this experiment we assigned participants to similar roles as in Experiment 1. That is, we again used the letter A to denote the person communicating guilt or no emotion, the letter B to denote the participant and the letter C to denote the other group member. The emotion manipulation was also kept identical: right before the dependent measures were administered the experimenter brought in a manually filled out form with guilt or no emotion information that was allegedly written by group member A.

Experiment 2 was in two important ways different from Experiment 1. First, participants in the high-provision-point condition were introduced to a public good dilemma in which they had to contribute 420 chips to reach the provision point. In the low-provision-point condition, participants had to contribute 210 chips to reach the provision point. Hence, if one were to follow the equality rule, one would need to contribute 70 chips in the low- and 140 chips in the high-provision-point condition. Because each participant had 200 chips available, participants had to contribute 35% and 70% to provide the public good in the low- and high-provision-point condition, respectively. We also explained that now the participant would join the group as a newcomer, the parameters of the game that were used in round one were changed. This was done so that participants were unable to determine what the provision point in the first decision round had been, allowing us to exclude the possibility that our results were influenced by any anchoring effects.

Second, because participants now had to play a trial in a public good dilemma, a financial incentive was introduced to promote the experimental realism of our paradigm (cf. Aquino, Steisel, & Kay, 1992). It was explained that the more chips one was able to accumulate, the higher the chance to win one of six prizes of €10 (approximately $13). These prizes were awarded one week after the experiment. When all instructions about the public good dilemma and the emotion feedback were provided, the dependent measures were administered.

Dependent measures. To understand how the emotion that was communicated by group member A would be interpreted with respect to previous events, participants indicated on a scale ranging from 1 = *totally disagree* to 7 = *totally agree* to what extent they agreed with the following item: “I think that group member A has contributed many chips during the first round”. The same question was asked for the third group member, who was known to participants as group member C. Participants also had to indicate whether or not they

believed that during the first round the public good had been provided. Our main dependent measure was the amount of chips that the participant was willing to contribute to the public good. In addition, we asked how many chips participants estimated that group member A would contribute and how much they estimated participant C to contribute to the public good. The provision point level was checked with the following question: "How many chips does the group need to contribute, so that the bonus will be disbursed to the group?" The effectiveness of the emotion manipulation was checked in the same way as in Experiment 1.

Results

Manipulation checks. Out of 152 participants, 4 participants (2.6%) were unable to correctly indicate the provision point level and they were removed from further analyses[2]. The emotion manipulation was checked with a 2 (emotion) × 2 (provision point) ANOVA, revealing only the expected main effect of emotion; $F(1, 144) = 246.19$, $p < .001$, $\eta^2 = .63$. Group member A was perceived to feel more guilty when guilt ($M = 6.45$, $SD = 1.20$) as opposed to no emotion ($M = 3.31$, $SD = 1.22$) was communicated.

Inferences about first decision round[3]. The relevant means for these inferences can be found in Table 1. We predicted participants to infer about the first decision round that the person communicating guilt had contributed little to the public good, leading them to expect that the provision point had not been reached. Therefore we submitted the items measuring estimated contributions of group member A and C to a 2 (emotion) × 2 (provision point) × 2 (group member) mixed-model ANOVA with the last factor as a repeated-measures variable. This yielded main effects of emotion ($F[1, 144] = 32.44$, $p < .001$, $\eta^2 = .18$; for guilt $M = 3.27$, $SD = 0.73$; for no emotion $M = 3.98$, $SD = 0.78$) and group member ($F[1, 144] = 194.82$, $p < .001$, $\eta_p^2 = .57$; for member A $M = 2.86$, $SD = 1.43$; for member C $M = 4.42$, $SD = 1.23$). These main effects were qualified by a significant Emotion × Group member interaction, $F(1, 144) = 172.81$, $p < .001$, $\eta_p^2 = .55$. In line with Hypothesis 1a, simple-effects

analyses revealed that when group member A communicated guilt, he or she was estimated to have contributed less in the first trial than group member C, $F(1, 144) = 353.21$, $p < .001$, $\eta_p^2 = .71$. This effect did not emerge when group member A communicated no emotion, $F < 1$, $p = .56$. In addition, two separate 2 (emotion) × 2 (provision point) ANOVAs on the items measuring estimated contributions of group member A and C in the first trial showed two main effects of emotion. Supporting Hypothesis 1b, when group member A communicated guilt, he or she was believed to have contributed less during the first trial than when no emotion was communicated, $F(1, 144) = 232.48$, $p < .001$, $\eta^2 = .62$.

In accordance with Hypothesis 1c, a 2 (emotion) × 2 (provision point) ANOVA on the item measuring to what extent participants believed that the provision point had been reached in the first trial, revealed that communicated guilt was believed to indicate a lower probability of collective success in the first trial ($M = 2.38$, $SD = 1.20$) than when no emotion was communicated ($M = 3.58$, $SD = 1.50$), $F(1, 144) = 28.43$, $p < .001$, $\eta^2 = .16$.

Finally, the results of a 2 (emotion) × 2 (provision point) ANOVA confirmed Hypothesis 1d. When group member A communicated guilt, group member C was perceived to have contributed more than when participants received neutral emotion feedback, $F(1, 144) = 18.11$, $p < .001$, $\eta^2 = .11$.

Expected contributions. Table 2 shows the means of all expected contributions, including the participants' own contributions. Whereas participants inferred that group member A had defected in the first decision round when he or she communicated guilt as opposed to no emotion, we also expected this effect to disappear for the upcoming decision round (Hypothesis 2a). To show that this effect was specific for group member A and not for group member C, we standardized participants' estimations of group member A and C's contributions in round one and round two using z-scores and conducted a 2 (emotion) × 2 (decision round) × 2 (group member) ANOVA, with the latter two factors being repeated-

measures variables. This yielded a significant three-way interaction, $F(1, 146) = 86.12$, $p < .001$, $\eta_p^2 = .37$. A separate 2 (emotion) × 2 (decision round) repeated-measures ANOVA on the estimated contributions of group member C did not reveal a significant interaction, suggesting that the reported effect of emotion on estimated contributions in round 1 (see hypothesis 1d) was not significantly different in round 2, $F(1, 146) = 1.94$; $p = .17$. A similar repeated-measures ANOVA on the estimated contributions of group member A, however, did reveal a significant interaction of Emotion × Decision round, $F(1, 146) = 102.90$, $p < .001$, $\eta_p^2 = .41$. Whereas participants inferred that a person communicating guilt had contributed less than a person communicating no emotion (as reported when testing Hypothesis 1c), in line with Hypothesis 2a this effect of emotion was no longer present in participants' estimation of group member A's contribution for the upcoming decision round.

Next, we tested if participants estimated group member C to be cooperative when guilt was communicated—even when the provision point was high (Hypothesis 2b)—by submitting this group member's expected contributions for the upcoming decision round to a 2 (emotion) × 2 (provision point) ANOVA. This yielded, first, main effects of provision point, $F(1, 144) = 65.32$, $p < .001$, $\eta^2 = .29$ and emotion, $F(1, 144) = 65.32$, $p < .001$, $\eta^2 = .29$. Participants expected higher contributions when the provision point was high ($M = 109.12$, $SD = 42.41$) than low ($M = 69.40$, $SD = 15.87$) and when guilt was communicated ($M = 95.85$, $SD = 39.87$) compared to no emotion ($M = 82.68$, $SD = 34.20$). These main effects were qualified by a significant Emotion × Provision point interaction, $F(1, 144) = 13.00$, $p < .001$, $\eta^2 = .06$. In line with Hypothesis 2b, simple-effects analysis indicated that when the provision point was high, participants predicted that group member C would contribute more when group member A communicated guilt instead of no emotion, $F(1, 144) = 18.33$, $p < .001$, $\eta^2 = .08$. This effect was absent when the provision point was low ($F < 1$, $p = .43$).

A 2 (emotion) × 2 (provision point) ANOVA on group member A and C's total expected contributions also yielded the predicted interaction (Hypothesis 2C); $F(1, 144) = 5.91$, $p < .05$, $\eta^2 = .03$. Again, compared to no emotion feedback ($M = 198.16$, $SD = 83.82$), communicated guilt led to higher expected contributions ($M = 238.19$, $SD = 52.24$) when the provision point was high, but this effect did not emerge with a low provision point ($F < 1$, $p = .79$).

Contributions. Participants' contributions were submitted to a 2 (emotion) × 2 (provision point) ANOVA, revealing main effects of provision point, $F(1, 144) = 104.28$, $p < .001$, $\eta^2 = .39$ and emotion, $F(1, 144) = 9.75$, $p < .005$, $\eta^2 = .04$. Contributions were higher when the provision point was high ($M = 123.73$, $SD = 42.32$) as opposed to low ($M = 72.01$, $SD = 17.93$) and when guilt ($M = 106.39$, $SD = 39.17$) as opposed to no emotion ($M = 89.34$, $SD = 41.92$) was communicated. More importantly and supporting Hypothesis 3a, the interaction between emotion and provision point was significant, $F(1, 144) = 7.09$, $p < .01$, $\eta^2 = .03$. Simple-effects analysis revealed that when the provision point was high, participants contributed more when guilt was communicated than when neutral emotion feedback was given, $F(1, 144) = 16.55$, $p < .001$, $\eta^2 = .06$. When the provision point was low, however, this effect was absent; $F < 1$, $p = .74$.

Adherence to equality and coordination. Even though these findings seem to suggest differences between conditions in adherence to equality, the correct procedure to validate this claim would be to test whether there are differences in the frequencies with which group members use the equality rule. Thus, participants were classified as following the equality rule when they contributed 70 chips and 140 chips in the low and high-provision-point condition, respectively. Using these strict criteria[4], 62 out of 148 participants adhered to equality. To examine this classification as a function of provision point and emotion, a hierarchical log-linear analysis was conducted (cf. Van Dijk & Wilke, 2000), revealing the

highest order interaction (Emotion × Provision point × Adherence to equality) to be significant, $\chi^2(1) = 7.47$, $p < .01$. To further explore this interaction, separate chi-square tests on the emotion and adherence to equality variables were performed at different levels of the provision point. In the high-provision-point condition, there was a significant effect of emotion on whether or not participants would adhere to equality, $\chi^2(1) = 5.31$, $p < .05$. In line with Hypothesis 3b, odds ratios indicated that the odds of adherence to equality when guilt was communicated was 3.24 times as high as the odds of adherence to equality when no emotion was communicated. When the provision point was low, however, this effect of emotion was absent, $\chi^2(1) = 2.29$, $p = .13$, odds ratio guilt: no emotion = 0.49:1.

Mediation analysis. We predicted that participants will use their expectations of both group member A and C's contributions in the upcoming decision round to determine whether or not they will contribute to the public good (Hypothesis 4). To examine this mediated moderation hypothesis, we decided to adopt a different approach than the one advocated by Baron and Kenny (1986). Even though their recommendations to establish mediation are widely used, their procedure has also been criticized for a lack of statistical power (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Moreover, it does not directly test the null hypothesis that the indirect effect significantly differs from 0. Another, more formal test of mediation that is commonly used, is the Sobel-test. However, this test requires distributional assumptions that may not be met in small sample sizes ($N < 200$; Preacher & Hayes, 2004; Shrout & Bolger, 2002). We therefore decided to test for mediation by adopting a bootstrap method as advocated by Preacher and Hayes (in press; see also Bollen & Stine, 1990; Preacher and Hayes 2004; Shrout and Bolger, 2002), which suffers from none of these disadvantages.[5]

Following Preacher and Hayes (in press), we used bootstrapping to estimate the indirect effect of the Emotion × Provision point term on participants' contributions with the

total expected contributions of both group member A and C as mediator, while controlling for the emotion and provision point terms. The basic idea of this procedure is to extract *n* cases with replacement from the original sample, and reestimate the size of the indirect effect in this new resample. This procedure should be repeated at least 1000 times. If, when using standard significance levels of $\alpha = .05$, the size of the indirect effect in at least 95% of these resamples is in all cases either larger or smaller than 0 (as indicated by the obtained confidence intervals), the indirect effect is significant. Accordingly, using 10,000 bootstrap resamples and bias corrected and accelerated intervals (see Preacher & Hayes, in press), we obtained confidence intervals that did not contain zero at the 99% level (i.e., LL CI = -7.23; UL CI = -0.11). Thus, the expected contributions of the other group members mediated the interaction effect between emotion and provision point on participants' own contributions ($p < .01$).

General Discussion

Taken together, the present results are supportive of the central hypothesis that communicated guilt is an important, socially informative cue that people use for their decisions to contribute and adhere to equality in a step-level public good dilemma. In addition, we identified a structural variable (i.e., provision point) that plays an important role in when differential effects of communicated guilt as opposed to neutral emotion feedback are particularly likely to emerge. The results show that communicated guilt has effects at three separate stages of the decision-making process. It does not only provide information about how fellow group members behaved in previous social dilemma interactions, but also about how these group members will behave in the future. Ultimately, communicated guilt is therefore also instrumental in making one's own contribution decisions. Below, we discuss the most important findings and implications.

The first important contribution of this research is that the communication of an emotion in a social dilemma is sufficient for people to draw conclusions about previous events in a social dilemma. Indeed, the mere communication of guilt readily led people to come up with the scenario of a selfish group member who added to collective failure despite the cooperative efforts of the other group member. As such the present research further emphasizes the salience of concepts such as collective failure and variance in cooperative behavior between group members, because even very basic information about how a fellow group member feels already revealed very strong effects on inferences that are related to these concepts (cf. De Cremer & Van Dijk, 2002; Samuelson & Messick, 1986). Note that obtaining these findings should be accredited to the use of a newcomer paradigm, because this required participants to make inferences about previous social dilemma interactions in which they did not take part.

People go beyond this question of which events induced an emotional state in a fellow group member, however. The present research shows that people also use information about a fellow group member's emotion as a basis for their expectations of this person's future contributions and even the future contributions of other fellow group members. More specifically, the results supported the idea that guilt mainly communicates an intention to *repair* instead of overcompensate one's detrimental action (cf., Baumeister et al., 1994; see also Wubben et al., in press). That is, a person communicating guilt was expected to contribute his or her fair share in the future, but not more than that. A possible explanation for this finding that a transgressor seems able to get away with merely promising to not transgress again may be that the victim of the detrimental action is partly comforted already by the knowledge that the experience of guilt is very unpleasant for the transgressor (Baumeister et al., 1994; O'Malley & Greenberg, 1983). Our findings suggest a complementary explanation however. Experiencing guilt may not only be a punishment for

the transgressor, but also a reward for the victim. That is, when a person communicates guilt, third parties also seem to evaluate the *other* group members as more prosocial than when guilt is not communicated. This forwards the interesting and paradoxical hypothesis that inducing the unpleasant feeling of guilt in a fellow group member may in itself be beneficial because it actually allows one to build a reputation of being a cooperator (cf. Hardy & Van Vugt, 2006).

The effects of communicated emotion are not merely limited to inferences about fellow group members. The present research also shows that the communication of guilt may actually increase one's own contributions to the public good by inducing people to adhere to equality more often. As such these findings respond to the recent call that "research on social dilemmas could be significantly improved by examining cooperation [...] as a process driven by emotion communication" (Boone & Buck, 2003, p. 176). In this regard it is important that participants were told that the person from whom they received emotional information was unaware that this information would be communicated to them. The question whether the display of guilt also induces cooperation in social dilemmas when strategic motives for communication are not excluded therefore remains to be addressed in future research (cf. Van Kleef et al., 2006).

The present research also reveals that differential effects of communicated guilt versus no emotion may not always become manifest. Only in situations where people are not so sure or even distrustful about their fellow group members' cooperative intentions may communicated guilt increase one's contributions. Such a situation occurs when the provision point is high (as opposed to low). Especially in that case participants fear wasting many resources as a result of their fellow group members' potential failure to assist in contributing the high amount of resources that is required to provide the public good. Our findings show that in such instances emotion information is evaluated as very useful and valuable

(Experiment 1). When the provision point is high, emotional information is useful because in the case of communicated guilt it signals that one's fellow group members may be expected to cooperate and thus there is less fear that one's own contribution is simply a waste of many resources. Under circumstances of a low provision point fear of wasting one's resources is less prevalent because the public good is easy to obtain. In fact, under conditions of a low provision point there was a nonsignificant tendency for people to evaluate communicated guilt as *less* valuable than no emotion information. Also, when in that case guilt was communicated there was a nonsignificant trend for people to deviate from equality more often in such a way that they contributed slightly more than necessary. These slight trends in the data lead to the interesting suggestion that when a coordination task is easy already, additional information may—even when it is favorable—only complicate coordination. This will merely cause participants to contribute more than necessary in order to "play it safe".

A final important finding of the present research is that the interactive effect of emotion and provision point on people's own contributions is mediated by their expectations of fellow group members' contributions. This suggests that people deliberately consider their fellow group members' expected contributions to decide whether or not they should act in the collective interest by trying to reach the provision point. Conversely, it is interesting to note that prior research has shown that communicated guilt in two-party negotiations encourages people to actually take advantage of their opponent's expected cooperation by setting higher goals for themselves and, subsequently, making less concessions (Van Kleef et al., 2006). This apparent controversy is easily reconciled, however. First, the cell means of the expected contributions of fellow group members when guilt was communicated indicate that there was little opportunity for such strategic mismatching, seeing that participants generally did not expect to reach the provision point by contributing less than the equality rule would prescribe. Moreover, as opposed to negotiations, the risk/reward ratio for strategic

mismatching in public good dilemmas may be perceived as quite high, because contributing too little would lead one to irreversibly squander one's complete contribution.

Following similar logic, we can provide evidence against two alternative explanations for our effects. First there is the possibility that the communication of guilt invokes a realization in people that apparently a social dilemma may induce guilt in oneself. This anticipated guilt may subsequently lead people to exhibit considerable levels of cooperation, even when the provision point is high. A second explanation is that the communication of guilt, which is a moral emotion (Tangney, 2007; Tracy & Robins, 2006), makes concepts of morality salient, thus encouraging cooperative behavior. First, these two explanations seem highly unlikely, because they cannot explain why, as mentioned above, in negotiations communicated guilt actually lead people to be less cooperative (Van Kleef et al., 2006). Moreover, our finding that people base their contribution decisions on their expectations of fellow group members' contributions is strong evidence for our explanation that communicated guilt reduces fear that the provision point will not be reached. This mediational role of expected fellow group members' contributions is less uniquely predicted by the alternative explanations of anticipated guilt or activated concepts of morality.

Before closing, we wish to outline a promising avenue for future research. Seeing that communicated guilt is an important emotional cue in social dilemmas, other emotions deserve scholarly attention as well. Anger in particular needs mentioning, because it can readily be elicited in social dilemmas (Stouten, De Cremer & Van Dijk, 2005) and has the potential to degrade the whole group to enduring defection (Schroeder, Steel, Woodell & Bembenek, 2003). Future research could therefore contribute significantly by focusing on preventing the potential escalating effect of communicated anger in social dilemmas. In a similar vein, social dilemma literature could be furthered by unveiling how communicated emotion may play a role in fostering and maintaining high levels of cooperation. For

example, will communicated happiness safeguard cooperation, or will it under some conditions actually encourage fellow group members to act more selfishly in the future? These questions highlight the necessity to investigate communicated emotion in social dilemmas.

To conclude, an important strength of the present research is that it is the first to show in social dilemmas that communicated emotion allows people not only to infer what happened in past interactions, but also to predict how their fellow group members will behave in the future. These expectations subsequently affect even people's own cooperative behavior in social dilemmas. The scarcity of research in this area is remarkable, given Dawes and colleagues' (1977) observation that it was not at all uncommon for the affect level in their social dilemma experiments to skyrocket. Our findings, then, are evidence that an intragroup focus—or a focus on emotional displays in particular—is fruitful for better understanding how groups may manage social dilemma situations.

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Footnotes

[1] Because participants' subjective evaluation of the difficulty of realizing the public good was measured *before* the emotion manipulation, there was no reason not to assume the orthogonality of both variables. Indeed, a one-way ANOVA showed that participants in the guilt condition did not find the provision point harder to obtain (M = 4.62, SD = 1.12) than participants in the no-emotion condition (M = 4.27, SD = 1.54), $F(1,45) < 1$, $p = .39$.

[2] Including these participants in the analyses showed the same pattern of results.

[3] Because the information provided in Experiment 2 prohibited participants from making any reasonable estimation of the provision point level in the first decision round, we did not expect nor obtained any effects of provision point on these measures.

[4]A limitation of using such strict criteria for adherence to equality is that participants who deviate only slightly from equality are lumped into the same category as participants who deviate heavily. Therefore we complemented this analysis with a 2 (emotion) × 2 (provision point) ANOVA on the absolute difference between participants' actual contributions and the amount that they should contribute to adhere to equality (i.e., 70 and 140 chips in the high and low-provision-point condition, respectively; cf. Van Dijk & Wilke, 2000). The results were in line with the analysis we presented above. We again observed a significant interaction, F (1,144) = 17.71, $p < .001$, $\eta^2 = .10$. Simple-effect analyses showed that communicated guilt led people to deviate from equality less (M = 11.67, SD = 16.43) than neutral emotion feedback (M = 41.03, SD = 44.63) when the provision point was high, F (1, 144) = 23.52, $p < .001$, $\eta^2 = .16$. This effect was absent when the provision point was low, F (1,144) = 1.17, $p = .28$ (Ms = 13.89 vs. 7.43, SDs = 17.94 vs. 10.37).

[5] If we were to follow Baron and Kenny's procedure, we would also arrive at the conclusion that group members' expected contributions mediated the interaction effect of emotion and provision point on own contributions, as will be shown here. First, predicting

participants' contributions by entering emotion, provision point and their interaction in a linear regression model yielded results that were identical to ANOVA. That is, the same interaction effect occurred ($\beta = -.16$; $p < .01$). When these three terms were used to predict expected contributions of fellow group members, the results also matched those of the reported ANOVA. Again a significant interaction of emotion and provision point ($\beta = -.16$; $p < .05$) was revealed. Third, when expected contributions were included as a covariate with emotion, provision point and emotion × provision point to predict own contributions, a significant effect of expected contributions on participants' contributions emerged ($\beta = .45$; $p < .001$). Finally, and most importantly, in this model the interaction effect between emotion and provision point on participants' contributions disappeared, $\beta = -.09$; $p = .12$.

Figure 1.

The relationship between emotion and instrumentality of communicated emotion as a function of judgment of provision point level (Experiment 1). Higher values reflect higher degrees of the variable measured.

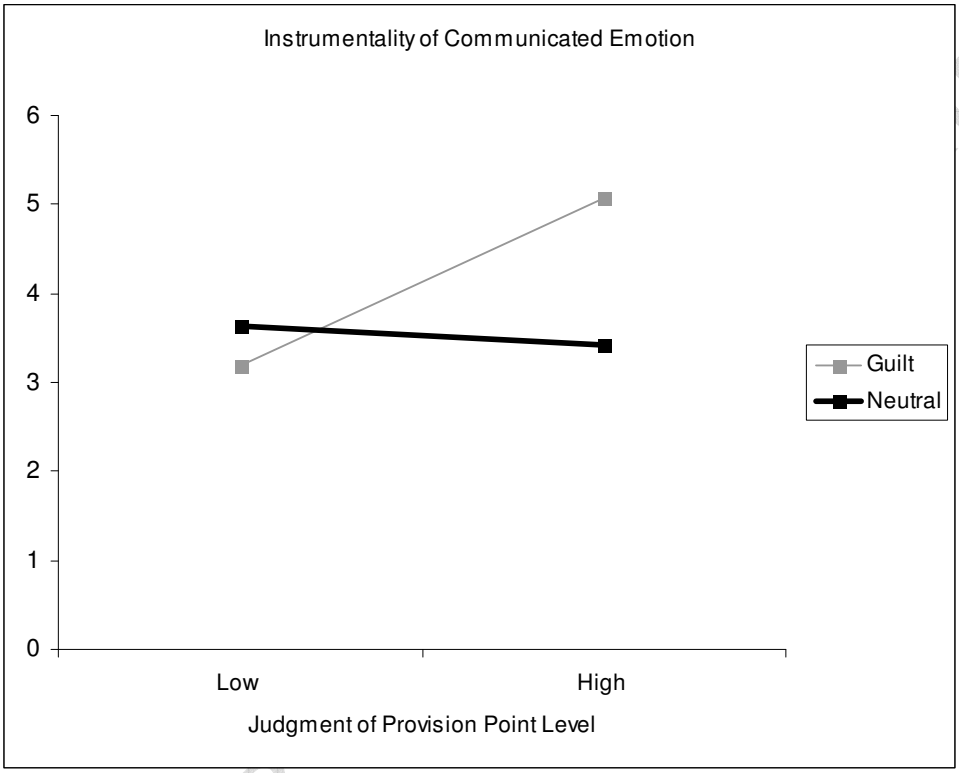

Table 1

Means and standard deviations on estimations of group members' contributions in decision round one by emotion (Experiment 2).

Dependent Variables	Emotion	
	Guilt	Neutral
Estimated contributions group member A[a]	1.69_a (0.67)	3.94_b (1.06)
Estimated contributions group member C[a]	4.85_c (1.37)	4.03_b (0.93)

Note. Higher scores indicate higher contributions. Standard deviations are given in parentheses. Means with a different subscript differ at $p < .05$.

[a]Group member A is the person communicating the emotion; group member C is the other fictional person.

Table 2

Means and standard deviations on participants' and estimations of group members' contributions in decision round two by emotion and provision point (Experiment 2).

Dependent Variables	Emotion	Provision Point	
		Low (210)	High (420)
Contributions participant	Guilt	73.26_a	138.61_c
		(22.57)	(20.20)
	Neutral	70.93_a	109.24_b
		(12.77)	(52.44)
Contributions group member A[a]	Guilt	70.29_a	113.75_b
		(32.13)	(39.14)
	Neutral	68.00_a	103.95_b
		(18.84)	(43.76)
Contributions group member C[a]	Guilt	66.43_a	124.44_c
		(18.49)	(33.76)
	Neutral	72.00_a	94.22_b
		(12.85)	(45.03)

Note. Higher scores indicate higher contributions. Standard deviations are given in parentheses. Means with a different subscript differ at $p < .05$ according to simple-effects analyses.

[a]Group member A is the person communicating the emotion; group member C is the other fictional person.